On page 2 of the Office Action, the Examiner rejected claims 1-23 under 35 U.S.C. §112, second paragraph, as being indefinite.

With respect to claims 1, 8, and 15, the Examiner recognizes that these claims are directed to a gas discharge tube. The Examiner asserts, however, that the invention of the present application is really directed to a ring laser gyroscope instead of a gas discharge tube and that the claims, therefore, are indefinite.

A ring laser gyroscope is a specific form of a gas discharge tube. Because a ring laser gyroscope is a gas discharge tube, it is not indefinite for applicant to recite a gas discharge tube in his claims. Accordingly, the claims are not indefinite.

The Examiner then asserts that claims 2, 4, 6, 9, 11, 13, 17, 19, 21, and 23 are indefinite because they use the word "substantially." However, the Examiner does not cite to the MPEP or to case law to support this rejection. Indeed, MPEP §706.03(d) does not state that the word "substantially" makes a claim indefinite. Moreover, many cases interpret this word as used in claims. Therefore, this word is an acceptable and well

understood term that means that exact identity between two elements is not required.

Accordingly, claims 2, 4, 6, 9, 11, 13, 17, 19, 21, and 23 are not indefinite.

The Examiner similarly asserts that claims 3, 7, 10, and 14 are indefinite because they use the phrase "extends substantially." However, claims 3, 7, 10, and 14 are not indefinite for the same reasons that claims 2, 4, 6, 9, 11, 13, 17, 19, 21, and 23 are not indefinite.

On page 3 of the Office Action, the Examiner rejected claims 1, 2, 8, 9, and 11-13 under 35 U.S.C. §102(b) as being anticipated by the Hendow patent.

Independent claim 1 is directed to a gas discharge tube having a block, a cathode, and an anode. At least a portion of the block is maintained at a reference potential. The cathode engages the block and is biased at a higher potential than the reference potential. The anode engages the block and is biased at a higher potential than the cathode.

The Hendow patent discloses a gas discharge tube in the form of a ring laser gyroscope 10 that includes a block 12 having four mounting faces 14-17. A plurality of mirrors 18-21 are mounted on the mounting faces 14-17. A cavity 22 is formed in the block 12 to

form a path between the mirrors 18-21. Voltage is applied between a pair of anodes 24 and 26 and a cathode 28 mounted on the block 12. As shown in Figure 1, the voltage applied to the cathode 28 is negative. However, the Hendow patent does not disclose whether the voltage applied to the anodes 24 and 26 is positive or negative.

Figure 2 of the Hendow patent illustrates a cavity length controller 50 in order to cause laser light in the cavity 22 to have maximum intensity. A mirror 20 allows a portion of the laser light to be transmitted to gain cells 58 and 66 of the cavity length controller 50.

A voltage is applied across an anode 60 and a cathode 62 of the gain cell 58 to excite a gas therein. The laser light stimulates the excited atoms to amplify the laser light. A voltage is also applied across an anode 68 and a cathode 70 of the gain cell 66. Accordingly, the gain cell 66 similarly amplifies the laser light. The cathodes 62 and 70 are coupled to a switch 72, which is controlled by an oscillator 74.

The switch 72 switches the cathodes 62 and 70 between ground and open. When the cathodes 62 and 70 are grounded, electric current is allowed to flow through the gain cells 58 and 66 to excite the gas therein. When the cathodes 62 and 70 are open, no current flows across the

gain cells 58 and 66 and the gases contained therein are not excited.

Accordingly, the cathodes 62 and 70 are driven between ground when the switch 72 is closed and the voltage of the anodes 60 and 68 when the switch 72 is open.

Therefore, there is never a condition according to the Hendow patent where, as required by independent claim 1, the cathodes 62 and 70 are biased above the reference potential and the anodes 60 and 68 are biased above the cathodes 62 and 70, because the cathodes 62 and 70 are either at the reference potential or they are at the potential of the anodes 60 and 68.

As a result, the Hendow patent does not anticipate independent claim 1 and does not anticipate claim 2 dependent thereon.

Independent claim 8 is directed to a gas discharge tube having a block, a cathode, and an anode. At least a portion of the block is maintained at a reference potential. The cathode engages the block and is biased at a lower potential than the reference potential. The anode engages the block and is biased at a higher potential than the reference potential.

As discussed above, and as disclosed in the Hendow patent, the cathodes 62 and 70 are driven between ground when the switch 72 is closed and the voltage of the anodes 60 and 68 when the switch 72 is open.

Therefore, there is never a condition according to the Hendow patent where, as required by independent claim 8, the cathodes 62 and 70 are biased below the reference potential and the anodes 60 and 68 are biased above the reference potential, because the cathodes 62 and 70 are either at the reference potential or they are at the potential of the anodes 60 and 68.

As a result, the Hendow patent does not anticipate independent 8 and does not anticipate claims 9 and 11-13 dependent thereon.

On page 4 of the Office Action, the Examiner rejected claims 3-7, 10, and 14-23 under 35 U.S.C. §103(a) as being unpatentable over the Hendow patent in view of the Ford patent.

The Ford patent discloses a ring laser gyroscope having a block 1 with passages 2 therein. A cathode 12 and anodes 13 and 14 are mated to the block 1. Figure 2 shows a representation of the critical portions of the ring laser gyroscope relative to the invention disclosed in the Ford patent. A cathode 20 is sealed to

a block 22. An anode 24 has a different voltage from the cathode 20. The mirrors and the mounting frame of the block 22 are grounded, and the anode 24 is connected to ground through a load resistor. The gas passages in the block 22 have a potential gradient from the cathode voltage to the anode voltage that creates an electric field 26 in the block 22. Lithium oxide in the block 22 is dissociated into lithium ions and oxide ions. The lithium ions drift toward the cathode 20.

Therefore, a current travels along the path between the cathode 20 and the anode 24. As a result, a layer of lithium-rich material is produced at the surface of the cathode 20. The layer of lithium-rich material is brittle, shortening the life of the gyroscope. As disclosed in the Ford patent, any reduction in this migration of lithium material should significantly improve gyroscope life.

The solution disclosed in the Ford patent is to add a dielectric barrier 40 between the cathode and the block. In view of the dielectric barrier 40, an electric field still exists in the block. However, the majority of the electric field occurs in the dielectric barrier 40 and not in the block 22, so that lithium migration is blocked.

As can be seen, the Ford patent does not the disclose setting the potentials of the cathode and anode as recited in independent claims 1 and 8. Instead, the Ford patent merely discloses the use of a dielectric barrier. Accordingly, the combination of the Hendow patent and the Ford patent does not teach or suggest the invention of independent claims 1 and 8. Therefore, independent claims 1 and 8 are not unpatentable over the Hendow patent in view of the Ford patent. Because independent claims 1 and 8 are patentable over the Hendow patent in view of the Ford patent, the claims dependent thereon are likewise patentable over the Hendow patent in view of the Ford patent.

Independent claim 15 is directed to a gas discharge tube having a block, a cathode, an anode, and a biasing electrode. The cathode and the electrodes engage the block, and the block comprises a plasma supporting passage between the cathode and the anode. The biasing electrode overlies the passage and extends substantially between the cathode and the anode. The biasing electrode has a bias to attract positive alkali ions.

The Examiner indicates that the Ford patent discloses a biasing electrode to attract positive alkali ions. However, the Examiner does not point to such a

biasing electrode in the Ford patent and, indeed, the Ford patent discloses no such biasing electrode.

The Ford patent does disclose that the ions migrate toward the cathode. However, as is clear from independent claim 15, the cathode is not the biasing electrode. Indeed, the cathode and the biasing electrode are separately recited in independent claim 15.

Moreover, the dielectric barrier 40 is not an electrode at all.

Therefore, neither the Hendow patent nor the Ford patent discloses or suggests the biasing electrode recited in independent claim 15. Therefore, independent claim 15 is not unpatentable over the Hendow patent in view of the Ford patent.

Because the independent claims of the present application are patentable over the Hendow patent in view of the Ford patent, the dependent claims are likewise patentable.

Attached hereto is a marked-up version of the changes made to the drawings, the specification, and the claims by the current amendment. The attachment is captioned **"VERSION WITH MARKINGS TO SHOW CHANGES MADE."**

In view of the above, the claims of the present application patentably distinguish over the art applied

by the Examiner. Accordingly, allowance of these claims and issuance of the present application are respectfully requested.

Respectfully submitted,

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VERSION WITH MARKINGS SHOWING CHANGES MADE

IN THE DRAWINGS

With the concurrence of the Examiner, applicant submits formal drawings herewith. Figure 1 of the formal drawings includes the legend "Prior Art."

IN THE SPECIFICATION

The paragraph beginning on page 4, line 7 is amended as follows:

--The accumulation of these positively charged ions at the cathode 22 can adversely impact the performance of the ring laser gyroscope 10. For example, the lithium ions can attack the indium seals between the cathode 22 and the block 12. Various solutions to this problem are offered in U.S. Patent No. 5,098,189 which discloses the use of a slot and/or secondary negative electrodes to reduce [of] or prevent lithium ion migration, in U.S. Patent No. 5,856,995 which discloses the use of a trap electrode to attract the lithium ions, and in U.S. Patent No. 6,025,914 which discloses the use of [an electric field] a dielectric barrier to reduce lithium ion migration.--

The paragraph beginning on page 12, line 7 is amended as follows:

--The source 120 may be arranged to maintain the cathode 112 either positive or negative with respect to the reference (e.g., ground) potential of the block 102 and to maintain the anodes 114 and 116 more positive than the cathode 112. For example, the source 120 may be arranged to maintain the anodes 114 and 116 positive with respect to the reference (e.g., ground) potential and to maintain the cathode 112 negative with respect to the reference (e.g., ground) potential. Alternatively, the source 120 may be arranged to maintain the cathode 112 positive with respect to the reference (e.g., ground) potential and to maintain the anodes 114 and 116 even more positive with respect to the reference (e.g., ground) potential. As a further alternative, the source 120 may be arranged to maintain the cathode 112 and the anodes 114 and 116 negative with respect to the reference (e.g., ground) potential with the anodes 114 and 116 being less negative than the cathode 112.--

IN THE CLAIMS

The claims are amended as follows:

11. (Amended) The gas discharge tube of claim [8] 10 wherein the reference potential is substantially ground.

12. (Amended) The gas discharge tube of claim [8] 10 wherein the biasing electrode is biased negatively with respect to the reference potential.